

***What Is Claimed Is:***

1. An isolated nucleic acid molecule consisting of a polynucleotide having a nucleotide sequence at least 90% identical to a sequence selected from the group consisting of:

- (a) a nucleotide sequence encoding a polypeptide comprising amino acids from 4 to 45 in SEQ ID NO:2 (Figure 1);
  - (b) a nucleotide sequence encoding a polypeptide comprising amino acids from 4 to 52 in SEQ ID NO:2 (Figure 1);
  - (c) a nucleotide sequence encoding a polypeptide comprising amino acids from 4 to 54 in SEQ ID NO:2; and
  - (d) a nucleotide sequence complementary to any of the nucleotide sequences in (a), (b), or (c);
- and optionally, a heterologous polynucleotide sequence.

2. The nucleic acid molecule of claim 1, wherein the selected sequence is (a).

3. The nucleic acid molecule of claim 1, wherein the polynucleotide sequence is at least 95% identical to sequence (a).

4. The nucleic acid molecule of claim 1, wherein the polynucleotide is (a).

5. The nucleic acid molecule of claim 1, wherein the selected sequence is (b).

6. The nucleic acid molecule of claim 1, wherein the polynucleotide sequence is at least 95% identical to sequence (b).

7. The nucleic acid molecule of claim 1, wherein the polynucleotide is (b).

8. The nucleic acid molecule of claim 1, wherein the selected sequence is (c).

9. The nucleic acid molecule of claim 1, wherein the polynucleotide sequence is at least 95% identical to sequence (c).

10. The nucleic acid molecule of claim 1, wherein the polynucleotide is (c).
11. The nucleic acid molecule of claim 1, wherein the selected sequence is (d).
12. The nucleic acid molecule of claim 1, wherein the polynucleotide sequence is at least 95% identical to sequence (d).
13. The nucleic acid molecule of claim 1, wherein the polynucleotide is (d).
14. The nucleic acid molecule of claim 1, wherein the heterologous sequence encodes a polypeptide
15. A method for making a recombinant vector comprising inserting an isolated nucleic acid molecule of claim 1 into a vector.
16. A recombinant vector produced by the method of claim 15.
17. A method of making a recombinant host cell comprising introducing the recombinant vector of claim 16 into a host cell.
18. A recombinant host cell produced by the method of claim 17.
19. A recombinant method for producing a polypeptide, comprising culturing the recombinant host cell of claim 18 under conditions such that the polypeptide encoded by the nucleic acid molecule of claim 1 is expressed, and recovering said polypeptide.
20. An isolated polypeptide having an amino acid sequence at least 90% identical to a sequence selected from the group consisting of:
  - (a) amino acids from 4 to 45 in SEQ ID NO:2 (Figure 1A);
  - (b) amino acids from 4 to 52 in SEQ ID NO:2 (Figure 1A); and
  - (c) amino acids from 4 to 54 in SEQ ID NO:2;and optionally, a heterologous polypeptide sequence.

21. An isolated antibody that binds specifically to the polypeptide of claim 20.
22. An isolated antibody that binds specifically to a polypeptide consisting of amino acid residues selected from the group consisting of:
- (a) amino acids 9 to 13 in SEQ ID NO:2;
  - (b) amino acids 28 to 31 in SEQ ID NO:2;
  - (c) amino acids 49 to 52 in SEQ ID NO:2;
  - (d) amino acids 105 to 111 in SEQ ID NO:2;
  - (e) amino acids 133 to 142 in SEQ ID NO:2; and
  - (f) amino acids 160 to 166 in SEQ ID NO:2;

23. A method of treating an immunodeficiency or condition associated with an immunodeficiency, comprising administering an effective amount of the polypeptide of claim 20, or the antibody of claim 21 or 22, to a patient in need thereof; wherein said immunodeficiency is a member selected from the group consisting of: severe combined immunodeficiency (SCID)-X linked, SCID-autosomal, adenosine deaminase deficiency (ADA deficiency), X-linked agammaglobulinemia (XLA), Bruton's disease, congenital agammaglobulinemia, X-linked infantile agammaglobulinemia, acquired agammaglobulinemia, adult onset agammaglobulinemia, late-onset agammaglobulinemia, dysgammaglobulinemia, hypogammaglobulinemia, transient hypogammaglobulinemia of infancy, unspecified hypogammaglobulinemia, agammaglobulinemia, common variable immunodeficiency (CVID), Wiskott-Aldrich Syndrome (WAS), X-linked immunodeficiency with hyper IgM, non X-linked immunodeficiency with hyper IgM, selective IgA deficiency, IgG subclass deficiency (with or without IgA deficiency), antibody deficiency with normal or elevated Igs, immunodeficiency with thymoma, Ig heavy chain deletions, kappa chain deficiency, B cell lymphoproliferative disorder (BLPD), selective IgM immunodeficiency, recessive agammaglobulinemia (Swiss type), reticular dysgenesis, neonatal neutropenia, severe congenital leukopenia, thymic aplasia-dysplasia or dysplasia with immunodeficiency, ataxia-telangiectasia, short limbed dwarfism, X-linked lymphoproliferative syndrome (XLP), Nezelof syndrome-combined immunodeficiency with

Igs, purine nucleoside phosphorylase deficiency (PNP), MHC Class II deficiency (Bare Lymphocyte Syndrome), and severe combined immunodeficiency.

24 A method of diagnosing an immunodeficiency or condition associated with an immunodeficiency, comprising contacting the polypeptide of claim 20, or the antibody of claim 21 or 22, with a biological sample, and assaying for binding to said protein or antibody; wherein said immunodeficiency is a member selected from the group consisting of: severe combined immunodeficiency (SCID)-X linked, SCID-autosomal, adenosine deaminase deficiency (ADA deficiency), X-linked agammaglobulinemia (XLA), Bruton's disease, congenital agammaglobulinemia, X-linked infantile agammaglobulinemia, acquired agammaglobulinemia, adult onset agammaglobulinemia, late-onset agammaglobulinemia, dysgammaglobulinemia, hypogammaglobulinemia, transient hypogammaglobulinemia of infancy, unspecified hypogammaglobulinemia, agammaglobulinemia, common variable immunodeficiency (CVID), Wiskott-Aldrich Syndrome (WAS), X-linked immunodeficiency with hyper IgM, non X-linked immunodeficiency with hyper IgM, selective IgA deficiency, IgG subclass deficiency (with or without IgA deficiency), antibody deficiency with normal or elevated Igs, immunodeficiency with thymoma, Ig heavy chain deletions, kappa chain deficiency, B cell lymphoproliferative disorder (BLPD), selective IgM immunodeficiency, recessive agammaglobulinemia (Swiss type), reticular dysgenesis, neonatal neutropenia, severe congenital leukopenia, thymic aplasia-aplasia or dysplasia with immunodeficiency, ataxia-telangiectasia, short limbed dwarfism, X-linked lymphoproliferative syndrome (XLP), Nezelof syndrome-combined immunodeficiency with Igs, purine nucleoside phosphorylase deficiency (PNP), MHC Class II deficiency (Bare Lymphocyte Syndrome), and severe combined immunodeficiency.

25. A method of treating an autoimmune disease or condition associated with an autoimmune disease, comprising administering an effective amount of the polypeptide of claim 20, to a patient in need thereof; wherein said autoimmune disease is a member selected from the group consisting of: autoimmune hemolytic anemia (including, but not limited to cryoglobulinemia or Coombs positive anemia), autoimmune neonatal thrombocytopenia, idiopathic thrombocytopenia purpura, autoimmunocytopenia, autoimmune neutropenia,

hemolytic anemia, antiphospholipid syndrome, dermatitis (e.g. atopic dermatitis), allergic encephalomyelitis, myocarditis, relapsing polychondritis, rheumatic heart disease, glomerulonephritis (e.g., IgA nephropathy), Multiple Sclerosis, Neuritis, Uveitis Ophthalmia, Polyendocrinopathies, Purpura (e.g., Henloch-Schoenlein purpura), Reiter's Disease, Stiff-Man Syndrome, Autoimmune Pulmonary Inflammation, Guillain-Barre Syndrome, insulin dependent diabetes mellitus, juvenile onset diabetes, autoimmune inflammatory eye, autoimmune thyroiditis, hypothyroidism (i.e., Hashimoto's thyroiditis), systemic lupus erythematosus, Goodpasture's syndrome, Pemphigus, Receptor autoimmunities such as, for example, (a) Graves' Disease, (b) Myasthenia Gravis, and (c) insulin resistance, autoimmune thrombocytopenic purpura, rheumatoid arthritis, gluten-sensitive enteropathy, dense deposit disease, scleroderma with anti-collagen antibodies, mixed connective tissue disease, polymyositis/dermatomyositis, pernicious anemia (Addison's disease), idiopathic Addison's disease, infertility, glomerulonephritis such as primary glomerulonephritis and IgA nephropathy, bullous pemphigoid, Sjogren's syndrome, diabetes mellitus, and adrenergic drug resistance (including adrenergic drug resistance with asthma or cystic fibrosis), chronic active hepatitis, primary biliary cirrhosis, other endocrine gland failure, vitiligo, vasculitis, post-MI cardiotomy syndrome, urticaria, asthma, inflammatory myopathies, and other inflammatory, granulomatous, degenerative, atrophic disorders, and other disorders such as inflammatory skin diseases including psoriasis and sclerosis, inflammatory bowel diseases (such as Crohn's disease and ulcerative colitis), respiratory distress syndrome (including adult respiratory distress syndrome, ARDS), meningitis, encephalitis, colitis, allergic conditions such as eczema and other conditions involving infiltration of T cells and chronic inflammatory responses, atherosclerosis, leukocyte adhesion deficiency, Reynaud's syndrome, and immune responses associated with acute and delayed hypersensitivity mediated by cytokines and T-lymphocytes typically found in tuberculosis, sarcoidosis, granulomatosis and diseases involving leukocyte diapedesis, central nervous system (CNS) inflammatory disorder, multiple organ injury syndrome, antigen-antibody complex mediated diseases, anti-glomerular basement membrane disease, Lambert-Eaton myasthenic syndrome, Beheet disease, giant cell arteritis, immune complex nephritis, IgA nephropathy, IgM polyneuropathies or autoimmune thrombocytopenia etc.

26. A method of diagnosing an autoimmune disease or condition associated with an autoimmune disease, comprising contacting the polypeptide of claim 20 with a biological sample, and assaying for binding to said protein; wherein said autoimmune disease is a member selected from the group consisting of: autoimmune hemolytic anemia (including, but not limited to cryoglobulinemia or Coombs positive anemia), autoimmune neonatal thrombocytopenia, idiopathic thrombocytopenia purpura, autoimmunocytopenia, autoimmune neutropenia, hemolytic anemia, antiphospholipid syndrome, dermatitis (e.g. atopic dermatitis), allergic encephalomyelitis, myocarditis, relapsing polychondritis, rheumatic heart disease, glomerulonephritis (e.g., IgA nephropathy), Multiple Sclerosis, Neuritis, Uveitis Ophthalmia, Polyendocrinopathies, Purpura (e.g., Henloch-Schoenlein purpura), Reiter's Disease, Stiff-Man Syndrome, Autoimmune Pulmonary Inflammation, Guillain-Barre Syndrome, insulin dependent diabetes mellitus, juvenile onset diabetes, autoimmune inflammatory eye, autoimmune thyroiditis, hypothyroidism (i.e., Hashimoto's thyroiditis), systemic lupus erythematosus, Goodpasture's syndrome, Pemphigus, Receptor autoimmunities such as, for example, (a) Graves' Disease, (b) Myasthenia Gravis, and (c) insulin resistance, autoimmune thrombocytopenic purpura, rheumatoid arthritis, gluten-sensitive enteropathy, dense deposit disease, scleroderma with anti-collagen antibodies, mixed connective tissue disease, polymyositis/dermatomyositis, pernicious anemia (Addison's disease), idiopathic Addison's disease, infertility, glomerulonephritis such as primary glomerulonephritis and IgA nephropathy, bullous pemphigoid, Sjogren's syndrome, diabetes mellitus, and adrenergic drug resistance (including adrenergic drug resistance with asthma or cystic fibrosis), chronic active hepatitis, primary biliary cirrhosis, other endocrine gland failure, vitiligo, vasculitis, post-MI cardiomy syndrome, urticaria, asthma, inflammatory myopathies, and other inflammatory, granulomatous, degenerative, atrophic disorders, and other disorders such as inflammatory skin diseases including psoriasis and sclerosis, inflammatory bowel diseases (such as Crohn's disease and ulcerative colitis), respiratory distress syndrome (including adult respiratory distress syndrome, ARDS), meningitis, encephalitis, colitis, allergic conditions such as eczema and other conditions involving infiltration of T cells and chronic inflammatory responses, atherosclerosis, leukocyte adhesion deficiency, Reynaud's syndrome, and immune responses associated with acute and delayed hypersensitivity mediated by cytokines and T-lymphocytes typically found

in tuberculosis, sarcoidosis, granulomatosis and diseases involving leukocyte diapedesis, central nervous system (CNS) inflammatory disorder, multiple organ injury syndrome, antigen-antibody complex mediated diseases, anti-glomerular basement membrane disease, Lambert-Eaton myasthenic syndrome, Behcet disease, giant cell arteritis, immune complex nephritis, IgA nephropathy, IgM polyneuropathies or autoimmune thrombocytopenia etc.

27. A method of treating an autoimmune disease or condition associated with an autoimmune disease comprising, administering an effective amount of the antibody of claim 22, to a patient in need thereof; wherein said autoimmune disease is a member selected from the group consisting of: autoimmune hemolytic anemia (including, but not limited to cryoglobulinemia or Coombs positive anemia), autoimmune neonatal thrombocytopenia, idiopathic thrombocytopenia purpura, autoimmunocytopenia, autoimmune neutropenia, hemolytic anemia, antiphospholipid syndrome, dermatitis (e.g. atopic dermatitis), allergic encephalomyelitis, myocarditis, relapsing polychondritis, rheumatic heart disease, glomerulonephritis (e.g., IgA nephropathy), Multiple Sclerosis, Neuritis, Uveitis Ophthalmia, Polyendocrinopathies, Purpura (e.g., Henoch-Schoenlein purpura), Reiter's Disease, Stiff-Man Syndrome, Autoimmune Pulmonary Inflammation, Guillain-Barre Syndrome, insulin dependent diabetes mellitus, juvenile onset diabetes, autoimmune inflammatory eye, autoimmune thyroiditis, hypothyroidism (i.e., Hashimoto's thyroiditis), systemic lupus erythematosus, Goodpasture's syndrome, Pemphigus, Receptor autoimmunities such as, for example, (a) Graves' Disease, (b) Myasthenia Gravis, and (c) insulin resistance, autoimmune thrombocytopenic purpura, rheumatoid arthritis, gluten-sensitive enteropathy, dense deposit disease, scleroderma with anti-collagen antibodies, mixed connective tissue disease, polymyositis/dermatomyositis, pernicious anemia (Addison's disease), idiopathic Addison's disease, infertility, glomerulonephritis such as primary glomerulonephritis and IgA nephropathy, bullous pemphigoid, Sjogren's syndrome, diabetes mellitus, and adrenergic drug resistance (including adrenergic drug resistance with asthma or cystic fibrosis), chronic active hepatitis, primary biliary cirrhosis, other endocrine gland failure, vitiligo, vasculitis, post-MI cardiomyopathy syndrome, urticaria, asthma, inflammatory myopathies, and other inflammatory, granulomatous, degenerative, atrophic disorders, and other disorders such as inflammatory skin diseases including psoriasis and sclerosis, inflammatory bowel diseases

(such as Crohn's disease and ulcerative colitis), respiratory distress syndrome (including adult respiratory distress syndrome, ARDS), meningitis, encephalitis, colitis, allergic conditions such as eczema and other conditions involving infiltration of T cells and chronic inflammatory responses, atherosclerosis, leukocyte adhesion deficiency, Reynaud's syndrome, and immune responses associated with acute and delayed hypersensitivity mediated by cytokines and T-lymphocytes typically found in tuberculosis, sarcoidosis, granulomatosis and diseases involving leukocyte diapedesis, central nervous system (CNS) inflammatory disorder, multiple organ injury syndrome, antigen-antibody complex mediated diseases, anti-glomerular basement membrane disease, Lambert-Eaton myasthenic syndrome, Bechet disease, giant cell arteritis, immune complex nephritis, IgA nephropathy, IgM polyneuropathies or autoimmune thrombocytopenia etc.

28. A method of diagnosing an autoimmune disease or condition associated with an autoimmune disease, comprising contacting the antibody of claim 22 with a biological sample, and assaying for binding to said antibody, wherein said autoimmune disease is a member selected from the group consisting of: autoimmune hemolytic anemia (including, but not limited to cryoglobulinemia or Coombs positive anemia), autoimmune neonatal thrombocytopenia, idiopathic thrombocytopenia purpura, autoimmunocytopenia, autoimmune neutropenia, hemolytic anemia, antiphospholipid syndrome, dermatitis (e.g. atopic dermatitis), allergic encephalomyelitis, myocarditis, relapsing polychondritis, rheumatic heart disease, glomerulonephritis (e.g., IgA nephropathy), Multiple Sclerosis, Neuritis, Uveitis Ophthalmia, Polyendocrinopathies, Purpura (e.g., Henloch-Schoenlein purpura), Reiter's Disease, Stiff-Man Syndrome, Autoimmune Pulmonary Inflammation, Guillain-Barre Syndrome, insulin dependent diabetes mellitus, juvenile onset diabetes, autoimmune inflammatory eye, autoimmune thyroiditis, hypothyroidism (i.e., Hashimoto's thyroiditis), systemic lupus erythematosus, Goodpasture's syndrome, Pemphigus, Receptor autoimmunities such as, for example, (a) Graves' Disease, (b) Myasthenia Gravis, and (c) insulin resistance, autoimmune thrombocytopenic purpura, rheumatoid arthritis, gluten-sensitive enteropathy, dense deposit disease, scleroderma with anti-collagen antibodies, mixed connective tissue disease, polymyositis/dermatomyositis, pernicious anemia (Addison's disease), idiopathic Addison's disease, infertility, glomerulonephritis such as



primary glomerulonephritis and IgA nephropathy, bullous pemphigoid, Sjogren's syndrome, diabetes mellitus, and adrenergic drug resistance (including adrenergic drug resistance with asthma or cystic fibrosis), chronic active hepatitis, primary biliary cirrhosis, other endocrine gland failure, vitiligo, vasculitis, post-MI cardiomyopathy syndrome, urticaria, asthma, inflammatory myopathies, and other inflammatory, granulomatous, degenerative, atrophic disorders, and other disorders such as inflammatory skin diseases including psoriasis and sclerosis, inflammatory bowel diseases (such as Crohn's disease and ulcerative colitis), respiratory distress syndrome (including adult respiratory distress syndrome, ARDS), meningitis, encephalitis, colitis, allergic conditions such as eczema and other conditions involving infiltration of T cells and chronic inflammatory responses, atherosclerosis, leukocyte adhesion deficiency, Reynaud's syndrome, and immune responses associated with acute and delayed hypersensitivity mediated by cytokines and T-lymphocytes typically found in tuberculosis, sarcoidosis, granulomatosis and diseases involving leukocyte diapedesis, central nervous system (CNS) inflammatory disorder, multiple organ injury syndrome, antigen-antibody complex mediated diseases, anti-glomerular basement membrane disease, Lambert-Eaton myasthenic syndrome, Behcet disease, giant cell arteritis, immune complex nephritis, IgA nephropathy, IgM polyneuropathies or autoimmune thrombocytopenia etc.

29. A method of increasing B cell proliferation, comprising administering an effective amount of the antibody of claim 22, to a patient in need thereof.

30. A method of increasing immunoglobulin production, comprising administering an effective amount of the antibody of claim 22, to a patient in need thereof.

31. A method of inhibiting B cell proliferation, comprising administering an effective amount of the polypeptide of claim 20 or the antibody of claim 22 to a patient in need thereof.

32. A method of inhibiting immunoglobulin production, comprising administering an effective amount of the polypeptide of claim 20 or the antibody of claim 22, to a patient in need thereof.